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LLNL Torso Phantom Assembly and Disassembly

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Foreword (by David P. Hickman):

The following scanned and recreated document from the LLNL In Vivo measurement Facility archives provides important historical as well as current methods for the proper handling of the LLNL Torso Phantom. This document was written circa 1980 and is intended for use by in vivo measurement facilities that perform calibrations using the LLNL Torso Phantom. Proper care and use of the LLNL Torso Phantom will greatly extend the useful lifetime of the phantom.

Phantom Assembly/Disassembly

The assembly, and disassembly of the Realistic Phantom are simple tasks and are, for the most part, self evident. However, there are some considerations that will make these tasks easier and assure long life of the parts. The assembly process is presented in Figures 1 through 9 while disassembly suggestions are illustrated in Figures 10 and 11. However, some specific comments are in order, the heart and some of the specific components are shown in Figures 12-14.

- As Figure 3 shows, it is best to load the lungs, heart and lymph node blocks as one unit. The heart and lymph node blocks should be rested on the right lung. After putting the left lung in place, insert this assembly into the torso (Figure 4). Press firmly against the bottom of each lung to insure that the lungs are positioned as high in the torso as possible.
- Figures 7 and 8 show that the abdominal block or the liver-liver envelope combination can be used interchangeably. However, for applications that do not require simulation of a separate liver, use of the abdominal blocks is recommended. This will make assembly and disassembly easier. It also will reduce stress on the relatively thin upper flap of the liver envelope.
- Figure 9 shows the torso with one chest plate in place. Chest plates are intended to be used only one at a time, not in combination. Although two or more of them could be used together, it will distort the natural geometry and may make reproducibility uncertain.
- It is not surprising in a tightly packed assembly like the phantom that disassembly is somewhat more difficult than assembly, particularly when the liver-liver envelope has been used. The tips on disassembly (Figures 10 and 11) show that removal should begin by inserting the fingers of the right hand under the upper right corner of the liver envelope (or abdominal block). Continue the process by gently lifting and tilting these pieces toward you. Then the upper kidney block can be removed by placing the index finger between the left lung and upper edge of the block. Press the heart upwards as the upper kidney block is withdrawn.
- There are some thin portions of the phantom components, particularly the flap of the liver envelope and the edges of the chest plates. Although most of the phantom components will accept relatively rugged treatment, these thin items are vulnerable to tearing. They can be mended if torn, but a little extra care will prevent the need for repair.

Figure 1. Realistic Phantom



Figure 2. Phantom torso with torso cover removed.



Figure 3(a) Sequence showing proper assembly of heart, lymph node block, and lungs before positioning in phantom torso.



Figure 3(b)



Figure 3(c)



Figure 4. Phantom with lungs, heart, and lymph node block in place.

Figure 3(d)



Figure 5. Phantom with upper kidney block in place.

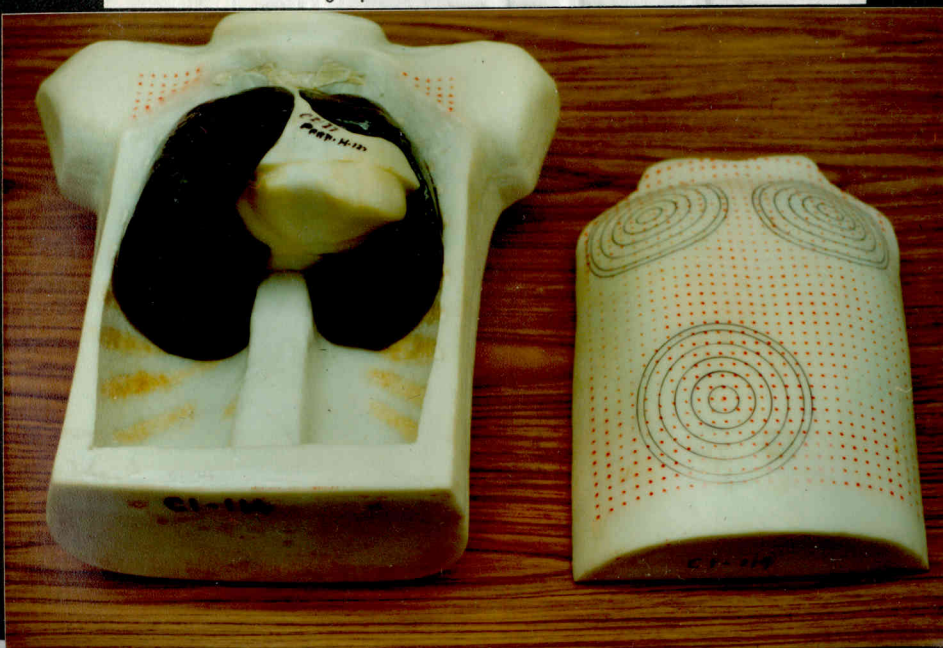


Figure 6. Torso with both kidney blocks in place.



Figure 7. Torso with abdominal block in place.



Figure 8. Torso with liver and liver envelope replacing abdominal block.



Figure 9. Torso with chest plate in place.

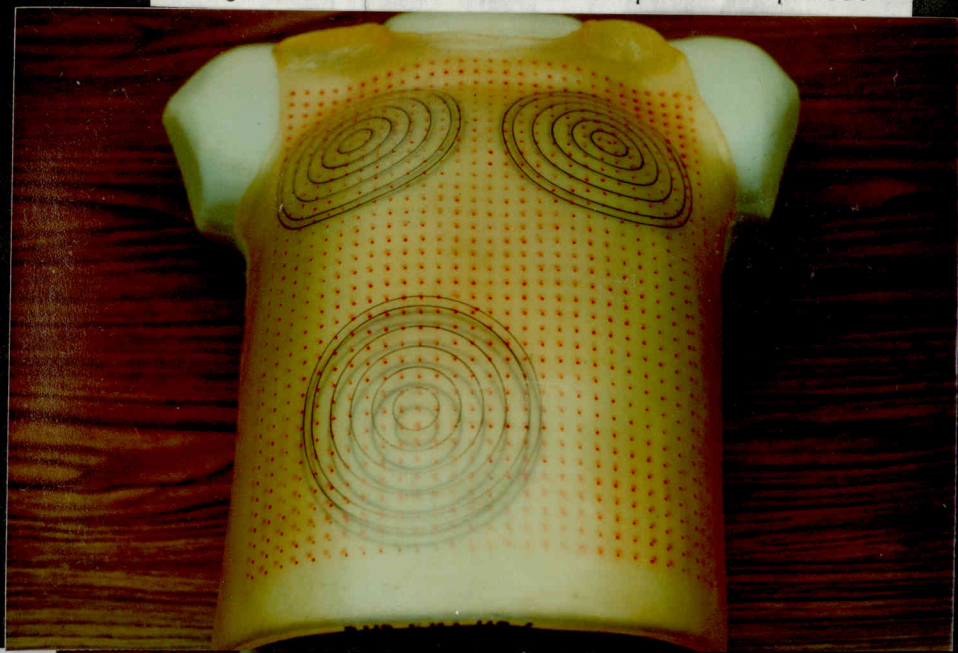


Figure 10(a) Proper removal of liver and liver envelope.

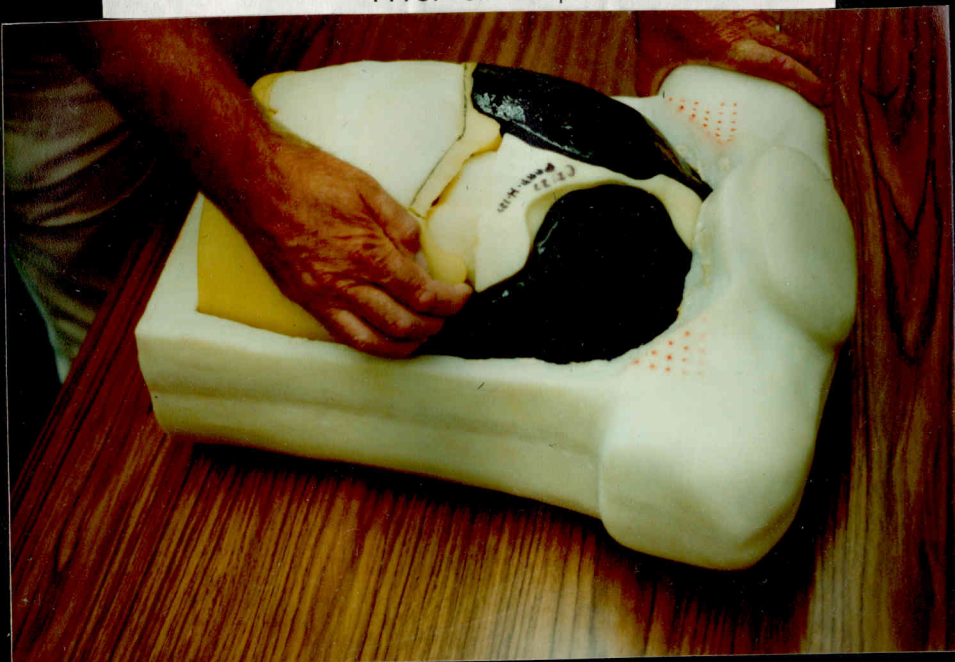


Figure 10(b) Liver and liver envelope gently lifted from torso.

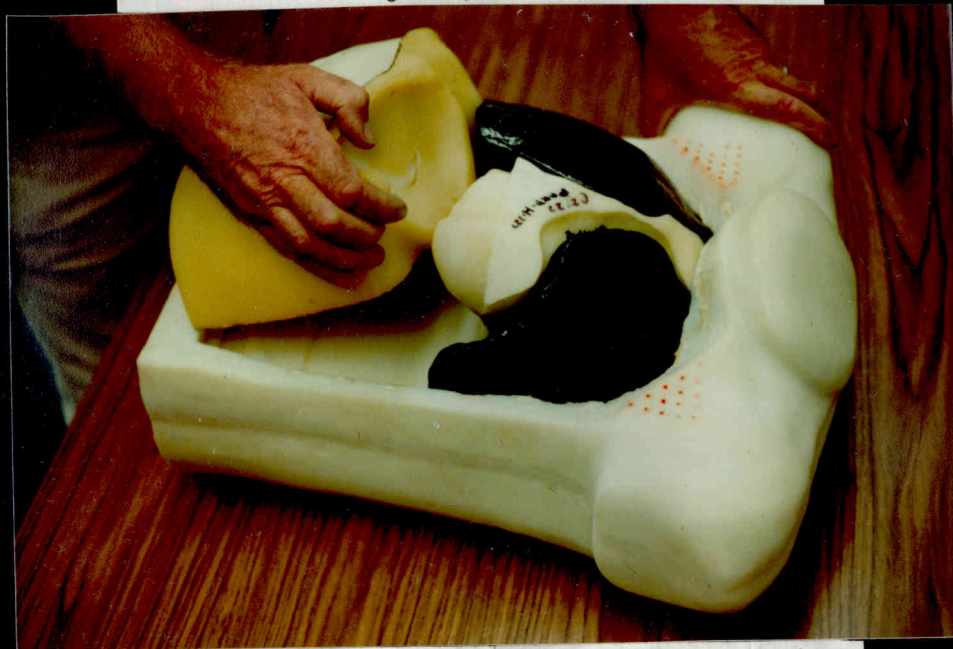


Figure 11(a) Proper removal of kidney block sections.



Figure 11(b) Proper removal of upper and lower kidney block by insertion of index finger between lungs and kidney blocks.

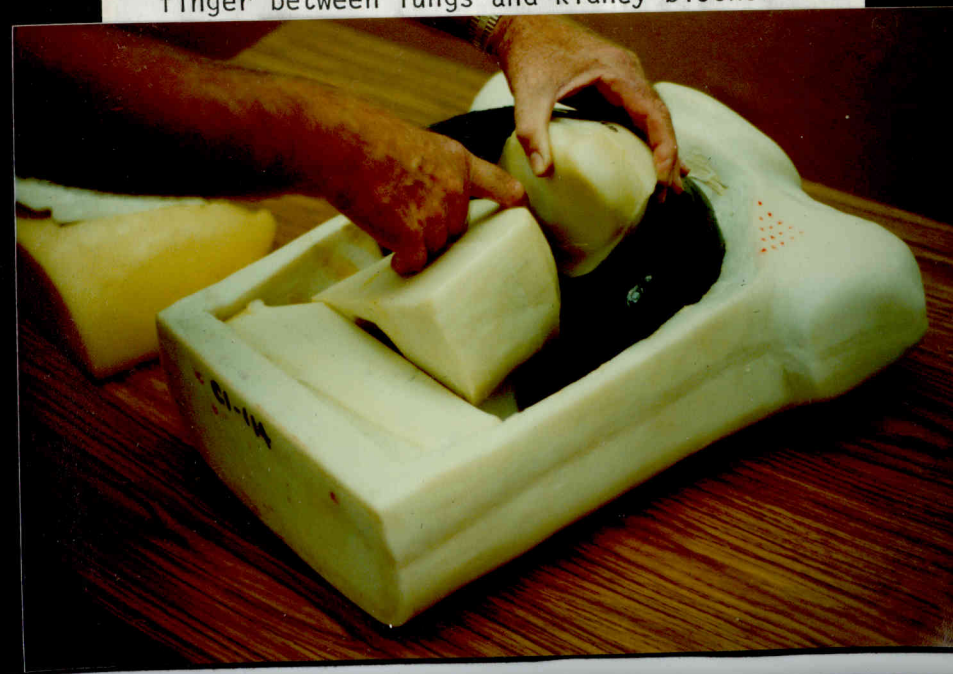


Figure 12. Heart and lymph node block.



Figure 13. Upper and lower kidney blocks with abdominal filler block.



Figure 14. Kidney blocks with liver envelope and liver.

